The Difference Between Verification and Validation of Analytical Methods in The Pharmaceutical Industry

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Introduction

Common Technical Documentation as a part of marketing authorization process contains: a pharmaceutical product characteristics including data of manufacturing process, quality control, safety (nonclinical), and efficacy (clinical) testing results. Although handling of the validation and verification of the method performance in quality control laboratory have been enormous improved in recent years, they still differ widely from laboratory to laboratory. Much of what has been published on this topic is difficult to apply in routine laboratories due to complex statistics. The result is that method validation is often implemented incorrectly, which leads to false conclusions about the performance of the method, potentially compromising patient safety. The purpose of qualification, validation and verification is to generate reliable data for the products tested, resulting in the delivery of quality drug products to the patient. Therefore, the aim of this research is to emphasize the differences between verification and validation of analytical methods in the pharmaceutical industry.

Materials and methods:

1. ICH Q2R1: Validation of Analytical Procedures: Text and Methodology. Proceeding of the International Conference on Harmonization of Technical Requirements for the Registration of Drugs for Human Use, Geneva, Switzerland, 2005
2. ICH Q4A - Pharmacopoeial Harmonisation
3. ICH Q2(R2)/Q14 EWG - Analytical Procedure Development and Revision of Q2 (R1) Analytical Validation, 2022

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VALIDATION OF ANALYTICAL PROCEDURES: TEXT AND METHODOLOGY
Q2(R1)

Results and discussion

Verification and method validation are not the same and have different requirements. An analytical method should be tested from different aspects to prove that the test results obtained by testing with this analytical method are reliable and we can trust them.

Analytical method validation parameters:

Type of analytical procedure / characteristics	IDENTIFICATION	TESTING FOR IMPURITIES: quantitat.	TESTING FOR IMPURITIES: limit	ASSAY: - dissolution (measurement only) / - content/potency
Accuracy	-	+	-	+
Precision				
Repeatability	-	+	-	+
Interm.Precision	-	+ (1)	-	+ (1)
Specificity (2)	+	+	+	+
Detection Limit	-	- (3)	+	-
Quantitation Limit	-	+	-	-
Linearity	-	+	-	+
Range	-	+	-	+

- signifies that this characteristic is not normally evaluated

+ signifies that this characteristic is normally evaluated

(1) in cases where reproducibility (see glossary) has been performed, intermediate precision is not needed

(2) lack of specificity of one analytical procedure could be compensated by other supporting analytical procedure(s)

(3) may be needed in some cases

Analytical method verification:

- Method verification is focuses on the suitability of an analytical test procedure for its intended use in actual experimental conditions.
- The laboratory must perform method verification on already validated method during the analytical transfer (before using it in routine analysis)
- The laboratory needs to perform method verification to ensure that proposed method by the manufacturer can be applied in their laboratory
- Verification of the method is not performed on all parameters according to ICH Q2R1
- The parameters that are recommended to be tested during method verification are: specificity, precision, linearity, detection limit and quantification limit

Difference Between Analytical Method Verification and Analytical Method Validation:

From a regulatory perspective, method validation evaluates the performance of an established method while method verification applies the necessary analytical performance characteristics to obtain reliable data for specific types of samples, environment, or equipment during laboratory method transfer.

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Conclusion

Method validation and method verification are required under different situations. Method validation is applied to an “new method” developed by a manufacturer of the pharmaceutical product; while method verification is applied to a “previously validated method” before it’s used in a particular laboratory for the first time for routine analysis. It is very important to distinguish when one method needs to be validated or verified and which statistical tests are appropriate for each.